

CHAPTER 3. TECHNOLOGY ASSESSMENT AND REQUIREMENTS ANALYSIS (TARA) PROGRAM

3-1. INTRODUCTION

a. Background. The TARA program originated with a 1992 tasking by the Corporate Information Management group (later designated the Medical Functional Information Management group) to evaluate commercial capabilities for technology assessment and capital equipment asset management. This tasking led to the award of a pilot contract in January 1993 to conduct an initial evaluation of Ireland Army Community Hospital, Fort Knox, KY, in the areas of diagnostic imaging and laboratory. The product fell short of the program goals, and the decision was made, with the concurrence of the Office of The Surgeon General (OTSG) radiology consultant, to develop an in-house program.

b. TARA Development. During the remainder of 1993, the USAMMA MMT-S (now MMO-AT) queried the technology assessment and asset management capabilities of several hospital systems and developed a composite program for AMEDD use (later designated the TARA program) that was first used at the Walter Reed Army Medical Center in April 1994. The Strategic Technology and Clinical Policies Council (STCPC) formally adopted the TARA program in January 1995, directing full integration of clinical consultants and requiring a TARA visit to every AMEDD medical activity and medical center on a 3-year basis. After the initial round of site visits, the frequency was changed to every 4 years for all MTFs, except medical centers remained on a 3-year review cycle.

c. Process Improvements and Cost Avoidance. The radiology model of the TARA program has resulted in process improvements for requirements generation and delivery of services, expedited modernization of diagnostic imaging systems, leveraged technology and industry by standardization and group buy initiatives and generated a cost avoidance of about \$117.2 million for the AMEDD since the first visit in April 1994. To continue the success of the TARA program, value-added processes continue to be developed and refined.

d. Laboratory TARA. At the request of the USAMEDCOM, a TARA program for the laboratory area of MTFs was developed at the beginning of FY 1998. Benefits similar to those achieved with the radiology model also occurred for laboratory, although on a smaller scale. The TARA team has determined that the laboratory model was most effective in equipment evaluations when applied to medical centers and community hospitals with a high volume of laboratory work or a unique laboratory function. However, Laboratory Interoperability (a laboratory data transfer system), ensuring third-party reimbursement (particularly when considering that the Army hospital laboratory handles hundreds of thousands of tests per year), and issues of data management and accuracy (as well as equipment issues) continue to be addressed regardless of the scope of laboratory operations. The TARA team recommends that medical centers consolidate, when practicable, as much laboratory testing as possible on high-volume analyzers and testing equipment. This consolidation may require sending testing that does not require a rapid turnaround from MTFs to the Medical Center (MEDCEN) within that RMC. The TARA team also encourages MEDCENs to continue to implement laboratory automation practices. (Laboratory automation is discussed in Chapter 4.)

3-2. THE TARA PROCESS

a. The on-site evaluation of current technology and management operations within the radiology and clinical laboratory departments is performed by the OTSG radiology and laboratory consultants, or their representatives, and personnel of the USAMMA MMO-AT to gather information and validate previously submitted data. The purpose of the site visit is to interview departmental staff, observe scheduling and patient-flow patterns, and evaluate quality of service and the condition and utilization of existing equipment. The TARA provides an unbiased review of the clinical processes, requirements, operations, and equipment for diagnostic imaging, radiotherapy, and clinical laboratory systems at the facility. The goal is to provide senior decision makers with the management information needed to make informed decisions on the clinical and technological resources required to accomplish business plan missions and to develop acquisition strategies that ensure optimal clinical outcomes. The mission is to ensure that medical technology within the AMEDD assessed under the TARA process remains on the established technology curve. Although state-of-the-art technology is expensive, benefits generally exceed the acquisition cost over the long run.

b. The TARA site visit consists of four major components.

(1) Assessment of clinical operations. The assessment is a clinical functional review by OTSG specialty consultants or senior clinicians. The functional review generally focuses on staffing, customer service, quality and risk management, patient management, appropriate functional task performance, and integration with other care areas. This review incorporates clinical input from the assessed facility with respect to workforce design, functional success, and mission, and compares the functional operation to accepted practice models. As a full AMEDD functional review, this evaluation also addresses leader development, training, and other military-relevant management issues.

(2) Assessment of requirements. Commercial, for-profit equipment utilization factors tempered by contingency issues unique to military hospitals are applied to the facility's workload to determine how the MTF compares with commercial counterparts. This comparison does not imply that the MTF should be held to commercial standards. However, these utilization factors provide the TARA team with benchmarks to begin the evaluation process.

(3) Assessment of operations. This includes an evaluation of procedural mix, staffing, work schedule, patient flow and throughput, and quality assurance and risk management to the extent that these factors apply to the acceptability and appropriate use of existing equipment.

(4) Assessment of equipment. This evaluation assesses whether the facility's existing equipment uses abandoned or obsolete technology and whether the equipment meets standards for acceptability. The assessment includes a market survey of current technology, a comprehensive evaluation of existing equipment, an evaluation of trends and developments that will affect diagnostic imaging, patient monitoring, and laboratory requirements at the MTF, and contract information where pertinent. The evaluation may include telecommunications equipment to determine if the existing infrastructure will support new teleradiology initiatives.

c. A TARA provides a snapshot of the facility's diagnostic imaging and clinical laboratory processes for the period during which the site survey was conducted. However, the TARA is not intended as a substitute for the facility's own routine evaluation of their operations. Because changes in a facility's strategic vision could alter diagnostic imaging or laboratory requirements, the requirements for the MTF should be periodically re-evaluated, especially in the event of a major change in mission.

d. The following information related to diagnostic imaging equipment will be requested and required prior to the site visit:

(1) Composite Healthcare System (CHCS) data for the number and type of procedures performed annually, workload data for the last 3 to 4 years showing trends, patient numbers for each modality, and data for referrals outside the MTF, ad-hoc reports from CHCS showing daily workload broken down by the hour for diagnostic radiology in order to identify peak workload for accurate assessment of needs;

(2) DMLSS maintenance histories for diagnostic imaging systems in the radiology department. This should include, if applicable, imaging systems elsewhere in the hospital such as the urology, obstetrics/gynecology sections, and orthopedics;

(3) Business plan, if available, addressing services currently provided and services to be initiated or discontinued, including supplemental care expenditures for radiology;

(4) Patient demographics for catchment area;

(5) Blueprint or diagram of radiology department;

(6) Staffing information including authorized positions and actual staff numbers; and

(7) Plans, diagrams, or descriptions of existing telecommunications and networking infrastructure.

e. The following information related to laboratory equipment will be requested and required prior to the site visit at medical centers:

(1) Current property listing for all laboratory equipment and maintenance histories for all major laboratory equipment in the facility and any outlying clinics;

(2) Organizational chart;

(3) Blueprint or diagram of laboratory department;

(4) TDA for pathology, including actual staffing numbers and names by department;

(5) Contract information with cost data for major equipment, including whether the equipment is cost per test, leased, or purchased;

(6) Cost data for major equipment for supplies and consumables by month and year;

(7) Copies of workload detail statistics reports on a CD or as e-mail attachment, with data broken down by month for the past 12 months;

(8) A copy of the facility's laboratory manual; and

(9) Medical Expense Performance Reporting System (MEPRS) reports for the past entire fiscal year. The reports should include the computational summary indicating direct expenses, support costs, and ancillary costs, for a minimum of the last two quarters and the step-down assignment statistics reports.

f. The following information related to network management may be requested prior to the site visit:

(1) Network topology, including information on voice, data, major vendors for local area network (LAN) hardware, and upgrade plans and schedules, if any.

(2) Bandwidth to desktop and bandwidth of the backplane and percentage of bandwidth in use during typical network loads.

(3) The network protocol, i.e. asynchronous transfer mode (ATM) or ethernet.

(4) The clinics on base or in remote locations, if any, the network supports and connectivity to the clinics.

(5) What major routers are in place and what networks do the routers interface?

g. Information on the wide area network (WAN), including what data is being carried on it.

h. The TARA will request that the facility dedicate a classroom or conference room for use during the visit for meeting and storing equipment and as a base of operations. In addition, the team would need internet connectivity and print capability (computer and printer); and if required by local regulations, visitor badges should be provided on arrival or during the in-brief.

3-3. TEAM APPROACH FOR TARA

a. Currently, the TARA team consists of radiology and laboratory consultants from OTSG (expertise from consultants in other specialties, i.e., radiation oncology, nuclear medicine, etc. is also available) and a group from the USAMMA. The USAMMA MMO-AT group contains specialists in biomedical and clinical engineering, medical physics, laboratory, and maintenance.

b. The team approach is necessary given the large amount of information that must be collected, organized, and analyzed. The preliminary analysis is presented to the commander during the out-brief. A formal report follows within 60 days.

c. The maintenance portion of the TARA is necessary to evaluate the MTF's equipment. Relatively new equipment with extensive unscheduled maintenance must be considered for replacement along with older technology. Outsourcing of maintenance contracts and the impact that has on the availability of the device must be assessed. The goal is to maximize the availability of diagnostic equipment, so that it may be used by the clinician. Assessment of the maintenance support of that equipment is extremely critical to achieving that goal.

d. The biomedical engineering component applies to the radiology and laboratory areas. They provide expertise in the area of equipment evaluation, but they are also responsible for the development of acquisition strategies for new and emerging medical systems within their sub-specialty.

e. The clinical component applies to both the radiology and laboratory areas. This assessment is performed by the OTSG Clinical Consultants or their representatives. They provide clinical guidance with respect to clinical acceptability of equipment and review clinical procedures within the departments. They work closely with the biomedical engineers in evaluating new and emerging medical systems. In addition, the clinical consultant assesses the staffing requirements within each facility and provides recommendations with respect to current staffing levels for both radiologists and support personnel (i.e., technologists, administrative assistants, etc.).

3-4. TARA SCHEDULE

The TARA schedule for FY 2007 through FY 2008 is shown in Table 3-1. If the Command at an MTF feels that TARA assistance is needed between scheduled site visits, assistance visits can be scheduled and coordinated at the Command's convenience. The TARA team keeps the up-to-date schedule at

http://www.usamma.army.mil/tara/tara_schedule.cfm

Table 3-1. TARA SITE VISIT SCHEDULE, FY 2007 THROUGH FY 2008

FY 2007		
Site	RMC	Scheduled Date
Knox	North Atlantic	Apr-07
WBAMC	Great Plains	May-07
Irwin	Western	Jul-07
CRDAMC	Great Plains	Aug-07

FY 2008		
Site	RMC	Scheduled Date
Lee/Eustis	North Atlantic	Nov-07
MAMC	Western	Jan-08
NCR	North Atlantic	Mar-08
West Point	North Atlantic	Jun-08
Drum	North Atlantic	Jun-08
Carson	Great Plains	Jul-08
DDEAMC	Southeast	Aug-08

3-5. CLINICAL APPROACH AND BUSINESS PROCESS RE-ENGINEERING

a. Radiologists who conduct the clinical component of the TARA site visit use the FEA (Business Process Reengineering [BPR] 1255047-035, September 4, 1996) as a guide for comparing and gathering information. The FEA defines the ideal radiology support necessary to improve the cost, quality, access, and readiness of military health care services. The recommended functional improvements enabled by digital radiology will strengthen the MHS push toward attaining designation.

b. The Joint Healthcare Management Engineering Team (JHMET) sponsored by the Air Force Management Engineering Agency released in August 1994 the *Joint Healthcare Manpower Standards Development Study* recommends approximately 6 staff personnel, including technologists, should be available to support each radiologist within the radiology department. For facilities without a radiologist or significant reception, clerical, or file room support, it is estimated that 1 technologist is required for every 1,500 studies. According to the radiology data collection survey and the DMIS summary report, military radiology departments had approximately 5.3 to 5.7 technologists and support staff for every radiologist in 1995. Most sites are close to established JHMET standard. The radiology workgroup predicts that changes in radiological technology will reduce the required support personnel.

3-6. REQUIREMENTS FOR OPERATIONS AND EQUIPMENT

a. The TARA team uses commercial equipment utilization factors, tempered by contingency issues unique to military hospitals. These utilization factors are applied to the facility's workload to determine how the hospital or clinic compares with commercial counterparts. This comparison does not imply that the hospital or clinic should be held to commercial standards. However, these utilization factors provide the TARA team benchmarks with which to begin the evaluation process. As shown in Tables 3-2 and 3-3, the TARA team used the following method to determine the ideal utilization (U) factors for each section of the radiology department:

$$U = \text{current MTF studies/year} \div (\text{expected MTF hours/year} \times \text{studies/hour}).$$

The utilization factor represents the number of systems needed to handle the patient workload at the facility. These factors are only used as guidelines and can

change from facility to facility, based on types of studies, mission, and the catchment area.

b. The productive use for diagnostic imaging equipment is based on the typical amount of time expected to perform a study, exam, or procedure. For example, an ultrasound study, on average, takes approximately 45 minutes, which equates to 1.33 studies per hour, as shown in Table 3-3. The productive use for clinical laboratory test equipment is based on the annual test volume divided by manufacturer's annual throughput. These numbers are then tempered according to hours of operation and test menu configuration. Calculations are instrument specific and can provide for a number of solutions depending on which make and models are used. Equipment focus is on what is currently in use, what is predominant within the region, and any equipment identified by the laboratory manager.

c. Once the number of hours per year and the studies per hour are determined, the 2 are multiplied together to conclude the ideal studies per year. For example, with ultrasound there are 2,000 available hours per year with 1.33 studies per hour, which equates to 2,660 ideal studies per year, as shown in Table 3-3.

d. Based on technologists' interviews and CHCS reports, the number of studies per year for the facility is determined and validated. This number is then divided by the ideal number of studies per year to determine the utilization requirement or the proposed number of systems that the department should have. For example, with ultrasound, a hospital seeing 4,500 patients per year will have a utilization of 1.7 or 2 systems.

Table 3-2. DIAGNOSTIC IMAGING HOURS AVAILABLE

Modality	Expected hours used per day	Expected days used per week	Expected weeks used per year	Expected MTF hours used per year
Radiography (Peak 4 hours)*	4	5	50	1,000
Radiography (all shifts)**	24	6	50	7,200
Fluoroscopy	5	5	50	1,250
Mammography	8	5	50	2,000
Ultrasound	8	5	50	2,000
Nuclear Medicine***				
Computed Tomography	16	6	52	4,992
Magnetic Resonance Imaging	16	6	52	4,992
Clinic	8	5	50	2,000
Radiation Therapy	7	5	50	1,750
R/F Simulator	7	5	50	1,750

* Workload for period of peak utilization (usually 0730 to 1130).

** Smaller facilities may essentially work only one shift with after-hours support to emergency room or urgent care being a small percentage of workload.

*** Gamma cameras for nuclear medicine typically see 5 patients per day and are used 230 days per year for an annual total of 1,150 patients/camera/year.

Table 3-3. DETERMINING EQUIPMENT UTILIZATION

Technology	Expected MTF Hours/Year	Studies/ Hour	Ideal Studies/ Year	Current MTF Studies/ Year	Utilization
Radiography (busiest shift) *	1,000	4	4,000	A	$A \div 4,000$
Radiography (all shifts) *	7,200	4	NA	NA	NA
Fluoroscopy	1,250	1.33	1,663	B	$B \div 1,663$
Mammography	2,000	2	4,000	C	$C \div 4,000$
Ultrasound **	2,000	1.33	2,660	D	$D \div 2,660$
Nuclear Medicine	1,840	1.6	1,150	E	$E \div 1,150$
CT ***	4,800	2	9,984	F	$F \div 9,984$
MRI ***	4,800	1	4,992	G	$G \div 4,992$
Clinic	2,000	5	10,000	H	$H \div 10,000$
Linear Accelerator ****	1,750	4	6,500	I	$I \div 6,500$
R/F Therapy Simulator	1,750	1	1,750	J	$J \div 1,750$

*Equipment utilization for general radiology is calculated to meet workload of busiest half of busiest shift, usually the shift between 0730 and 1130.

**Calculations are based on actual management engineering time studies; each procedure has been assigned room productivity times. The exact time was based on industry information tempered by unique aspects of the DOD's medical operations and the operation of the local facility. The following example shows how this method was used to derive the equipment utilization factor for ultrasound.

Equipment	Ultrasound
Hours available/year	8 hours/day \times 5 days/week \times 50 weeks = 2,000 hours/year
MTF Productive time	1.33 study/hour (45 minutes/study for MEDDAC/MEDCEN)
Ideal studies/year	1.33 study/hour \times 2,000 hours/year = 2,660 ideal studies/year
MTF studies/ year	4,500 studies/year
Utilization factor	$4,500 \text{ studies/year} \div 2,660 \text{ ideal studies/year} = 1.7 \text{ systems}$

***MTF hours of operations and number of studies per year for CT and MRI are based on DOD standards. However, the number of studies per hour that can be conducted on these systems is being reviewed as scanning times have become shorter. As a result of shorter scanning times, the ideal number of patients per year may increase and the equipment utilization factor may decrease.

****Linear accelerator is number of treatments, not patients (most patients require a number of treatments), and rounded down to reflect complexity of some procedures that require additional time on the machine.

3-7. TARA CYCLE REVIEW

a. The radiology model of the TARA program has resulted in process improvements for requirements generation for new equipment and delivery of services, expedited modernization of diagnostic imaging systems, leveraged technology and industry by standardization and group buy initiatives and generated a cost avoidance of approximately \$117.2 million since 1994 (Table 3-4). In addition, the laboratory model generated a cost avoidance of approximately \$2.4 million since FY 1998. The direct cost avoidance from the TARA process is based on the removal of technology that is no longer required. The benefits from corrections in scope are

gained when, after TARA review, requested technology is replaced with lower cost technology that is more appropriate for the clinical requirements and workload at the MTF.

b. During the first complete TARA cycle, about 40 Army MTFs were visited. (Since that time, the total number of facilities visited has reached about 75, including facilities of the Air Force, Navy, and Department of Veterans Affairs.)

c. Facilities are often short of clerical staff for the radiology department. This reduces the efficiency and throughput of the department because technologists spend significant time performing clerical duties (e.g., performing receptionist duties or entering patient data). Adequate clerical support will probably increase the department's overall productivity.

Table 3-4. TARA PROGRAM COST AVOIDANCE TO DATE

Fiscal Year	Cost Avoidance (Radiology)	Savings (Maintenance)	Savings Standardization (Group Buys)	Cost Avoidance Laboratory
1994	\$10,975,000	\$1,097,500		NA
1995	\$14,553,250	\$1,455,325		NA
1996	\$11,455,700	\$1,145,570		NA
1997	\$3,289,000	\$328,900		NA
1998	\$3,959,000	\$395,900		\$1,677,750
1999	\$4,059,100	\$405,910		\$688,000
2000	\$3,123,800	\$312,380	\$722,000	\$117,000
2001	\$6,285,000	\$628,500		NA
2002	\$425,000	\$42,500	\$857,563	NA
2003	\$4,530,000	\$453,000	\$3,162,775	NA
2004	\$3,204,000	\$320,400		NA
2005	\$8,286,000	\$828,600	\$2,050,252	NA
2006	\$16,992,000	\$1,699,200	\$7,009,344	NA
2007*	\$640,000	\$64,000		
Total	\$91,776,850	\$9,177,685	\$13,801,934	\$2,482,750
* through Dec 2007		Total Cost Avoidance/Savings →		\$117,239,219

d. With the start of TRICARE Next Generation, MTFs are responsible for funding cost of exams for patients referred to outside facilities. Consequently, the TARA team now evaluates the types of exams sent out for patient care and the cost of the exams. The TARA team provides recommendations to help bring studies back into the MTF or help justify why it is cost beneficial to send patients out of the network.

e. Previously, analog fluoroscopic systems had excessive downtime attributable to problems with the imaging chain and spot-film devices, requiring MTFs to have a backup system to accommodate their workload. The conversion to digital technology eliminates mechanical complexity and improves the reliability of the systems making backup fluoroscopy systems no longer necessary. The point here is twofold:

(1) Requirements should not be approved based solely on the fact that a facility is replacing an existing system.

(2) Workload, maintenance, and facility considerations change periodically and should always be evaluated in the approval process. In addition, staffing, facilities, and maintenance services are an integral part of any diagnostic imaging "system" and materially affect the facility's requirement.

f. Military radiology faces challenges in providing high-quality health care for all Armed Forces personnel and other beneficiaries within a changing military medicine environment. The goal of military radiology is to achieve the readiness capability required by military commands, to maximize the value of its health care services, and to promote a coordinated, collaborative Tri-Service approach to radiology. Several constraints affect the ability of the Military Healthcare System (MHS) to successfully fulfill the requirements of this goal, and with current limitations and changes in the health care environment, military radiology must prepare for the future.

g. The conversion to digital technology enhances efficiency and improves access to services. The proliferation of digital acquisition and processing devices and, ultimately, "filmless" hospital archive and teleradiology systems such as DIN-PACS is necessary to meet the MHS objectives outlined for radiology such as reducing report turnaround times and improving image accountability. Wet-chemistry-film processing, except for mammography, should be replaced with computed radiography. Networking of ultrasound and nuclear medicine systems to modality processing systems enhances clinician and technologist productivity. Establishing this network also reduces life-cycle costs by extending the life expectancy of the systems and allowing relatively inexpensive software upgrades in lieu of expensive hardware replacement. Digital technology is now more standard of care than emerging or state of the art, and few vendors still produce analog systems.

h. The military radiology community recognizes both the need for change and the opportunities for change that exist and has undertaken the corporate information management BPR effort (results published in the *FEA, BPR 1255047-035*, September 4, 1996). Rather than focusing on a specific technological solution, the goal of this effort is to streamline radiology activities and processes. The future of military healthcare will be characterized by access to high-quality care anytime and anywhere with total integration of patient records. These requirements magnify the limitations of current radiology services.